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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/071,014	02/07/2002	Peter L. Fu	005858P7148	8752

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BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP
Seventh Floor
12400 Wilshire Boulevard
Los Angeles, CA 90025-1030

EXAMINER

MCLEAN MAYO, KIMBERLY N

ART UNIT	PAPER NUMBER
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2187

DATE MAILED: 12/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/071,014

Applicant(s)

FU, PETER L.

Examiner

Kimberly N. McLean-Mayo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-13 and 20-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-13 and 20-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The enclosed detailed action is in response to the Amendment submitted on August 23, 2004.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 21 recites the limitation "the associated set" in Line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 3-13 and 20-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Loechel (USPN: 5,895,485).

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Regarding claim 3, Loechel discloses reading data from a first dirty cache line in a cache memory (Figure 10, Reference 1004; when the cache lines are flushed, the lines are read out of the cache and then written to the persistent storage); determining if the data is corrupt and marking the first cache line invalid if the data is corrupt (C 7, L 63-67; C 8, L 1-2; determined by the valid bit; invalid indicates corrupt); determining if a duplicate cache line exists (C 10, L 44-46; determined as such when the cache is setup with write-back cache enabled); determine if the data within the duplicate cache line is corrupt if the duplicate cache line exists (C 7, L 63-67; C 8, L 1-2; determined by the valid bit; invalid indicates corrupt); writing [flushing] the data to a first location in memory if the duplicate cache line is not corrupt (C 9, L 26-27); and marking the first cache line available [clearing the dirty bit] (when the cache lines are written to the persistent memory, the lines are cleared in the cache).

Regarding claims 4-5 and 12, Loechel discloses writing the data to the first memory location if the data is not corrupt (step 809 in Figure 8); marking the cache line available [clearing the dirty bit] (when the cache lines are written to the persistent memory, the lines are cleared in the cache); determining at least one duplicate dirty cache line for the first dirty cache line and marking each duplicate dirty cache line as an available cache line (C 9, L 15-18); marking the duplicate dirty cache lines invalid if the data within the duplicate dirty cache line is corrupt (C 7, L 63-65; when the data contains invalid data the cache lines are marked invalid).

Regarding claims 6 and 13, Loechel discloses determining that no duplicate cache line exists (C 10, L 44-46; determined as such when the cache is setup with write-back cache disabled).

Regarding claims 7 and 10, terminating the method if a duplicate cache line is not found (the method is terminating since when there is no duplicate cache line, the cache is operating in a write-through mode).

Regarding claims 8-9, Loechel discloses reading data from a first cache line in a plurality of cache lines in a cache (Figure 10, Reference 1004; when the cache lines are flushed, the lines are read out of the cache and then written to the persistent storage); determining if the first cache line is a clean line (C 8, L 2-5; determined by the dirty bit); determining if the data is corrupt (C 7, L 63-67; C 8, L 1-2; determined by the valid bit; invalid indicates corrupt); determine if a duplicate cache line exists (C 10, L 44-46; determined as such when the cache is setup with write-back cache enabled); determine if the data within the duplicate cache line is corrupt if the duplicate cache line exists (C 7, L 63-67; C 8, L 1-2; determined by the valid bit; invalid indicates corrupt); writing [flushing] the data to a first location in memory if the duplicate cache line is not corrupt (C 9, L 26-27); and marking the first cache line available [clearing the dirty bit] (when the cache lines are written to the persistent memory, the lines are cleared in the cache).

Regarding claim 20, Loechel discloses a cache memory (Figure 2, Reference 228); and a cache controller coupled to the cache memory to receive a request to write data to a location with the cache memory (Figure 2, Reference 226); read data from a first dirty cache line in a cache memory (Figure 10, Reference 1004; when the cache lines are flushed, the lines are read out of the cache and then written to the persistent storage); mark the first cache line invalid if the data is

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corrupt (C 7, L 63-67; C 8, L 1-2; determined by the valid bit; invalid indicates corrupt); determine if a duplicate cache line exists (C 10, L 44-46; determined as such when the cache is setup with write-back cache enabled); write [flushing] the data to a first location in memory if the duplicate cache line is not corrupt (C 9, L 26-27); and mark the first dirty cache line available [clearing the dirty bit] (when the cache lines are written to the persistent).

Regarding claim 21, Loechel discloses invoking a replacement policy to free cache lines in the cache if there are no cache lines available (Figure 8b, Reference 806; C 8, L 35-36).

Regarding claim 22, Loechel discloses writing the data to the first memory location if the data is not corrupt (step 809 in Figure 8); marking the cache line available [clearing the dirty bit] (when the cache lines are written to the persistent memory, the lines are cleared in the cache); determining at least one duplicate dirty cache line for the first dirty cache line and marking each duplicate dirty cache line as an available cache line (C 9, L 15-18); marking the duplicate dirty cache lines invalid if the data within the duplicate dirty cache line is corrupt (C 7, L 63-65; when the data contains invalid data the cache lines are marked invalid).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Loechel (USPN: 5,895,485).

Loechel discloses the limitations cited above in claim 10, however, Loechel does not disclose reading from a second cache line if the data is corrupt and the first cache line is clean. However it is well known in the art to perform such functions in a multiple processor system with shared multiple caches, using the MESI protocol. When a cache line is contained within one of the caches as invalid data, the data (a second cache line) is retrieved from another cache which contains valid data. This is done for cache coherency. Hence, it would have been obvious to one of ordinary skill in the art to implement such a feature in Loechel's system for the desirable purpose of cache coherency.

Response to Arguments

9. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after

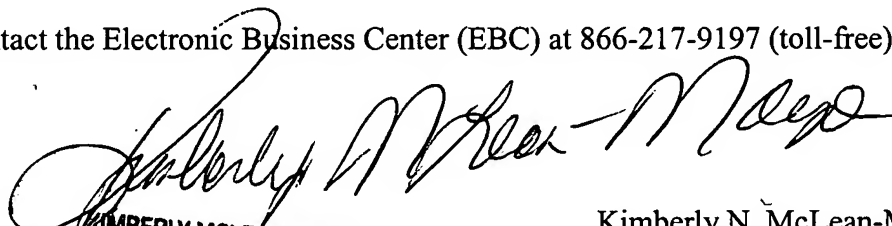
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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimberly N. McLean-Mayo whose telephone number is 703-308-9592. The examiner can normally be reached on M (10:00 - 6:30); Tues, Thr (10:00 - 4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on 703-308-1756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



KIMBERLY MCLEAN-MAYO
PRIMARY EXAMINER

Kimberly N. McLean-Mayo
Examiner
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KNM

December 10, 2004